Patent Claims

1. Method for controlling an automated clutch of a motor vehicle having a drive unit such as an engine with a crankshaft and a driven unit such as a transmission with at least one transmission input shaft and at least one transmission output shaft, wherein the automated clutch is arranged between the crankshaft and at least one transmission input shaft, and wherein during at least one operating phase of the vehicle, the automated clutch is controlled dependent on at least an engine rpm-gradient (dn_m/dt), characterized in that the engine rpm-gradient (dn_m/dt) is determined in the following manner:
   a) a first engine rpm-gradient signal ($dn_m(M)/dt$) is determined based on an engine torque signal (M_e) and a target value (M_k) of the clutch torque;
   b) an engine rpm-rate signal ($n_m(R)$) is determined based on said engine rpm-gradient signal;
   c) an engine rpm-rate (n_m) is compared to said engine rpm-rate signal ($n_m(R)$) and a correction quantity K is determined based on said comparison;
   d) the engine rpm-gradient signal ($dn_m(M)/dt$) is corrected with said correction quantity.

2. Method in particular according to claim 1, characterized in that the first engine rpm-gradient signal ($dn_m(M)/dt$) is based on taking a difference between the engine torque signal (M_e) and the target value (M_k) of the clutch torque.

3. Method according to one of the claims 1 and/or 2, characterized in that the correction quantity K is based on taking a difference between the engine rpm-rate (n_m) and the engine rpm-rate signal ($n_m(R)$).

4. Method according to one of the claims 1 to 3, characterized in that the correction quantity (K) is assigned a predetermined weight in the correction of the first engine rpm-gradient signal ($dn_m(M)/dt$).

5. Method according to one of the claims 1 to 4, characterized in that in the method a compensation is provided for a time lag occurring between a time when a signal is generated and a time when said signal is used in the method.

6. Method according to claim 5, characterized in that the time lag between the engine rpm-rate (n_m) and the engine rpm-rate signal ($n_m(R)$) is compensated.

7. Method according to claim 6, characterized in that the compensation is applied directly to the engine torque signal (M_e).

8. Method according to claim 6, characterized in that the compensation is effective on the engine rpm-rate signal ($n_m(R)$).

9. Method according to one of the claims 1 to 8, characterized in that the engine rpm-gradient (dn_m/dt) is used to identify a characteristic quantity of the clutch.

10. Method according to claim 9, characterized in that the characteristic quantity of the clutch comprises a friction value (RW) approximating a physical friction value of the clutch.

11. A method for controlling an automated clutch in a power train of a motor vehicle having a drive unit such as an engine with a crankshaft and a driven unit such as a transmission with at least one transmission input shaft and at least one transmission output shaft, wherein the automated clutch is arranged between the crankshaft and the at least one transmission input shaft, and wherein a torque

to be transmitted from the drive unit to the transmission is transmitted by means of a frictional engagement between a component that is rotationally fixed on the crankshaft and a component that is rotationally fixed on the at least one transmission input shaft, wherein said frictional engagement is characterized at least by a physical friction value that changes dependent on an operating state of the clutch, wherein the physical friction value is modeled as a friction value (RW) in a clutch control unit based on at least one parameter of the power train, characterized in that the model of the physical friction value contains a component representing a dependency of the friction value (RW) on a clutch temperature.

12. Method according to claim 11, characterized in that the clutch temperature is measured by means of a temperature sensor.

13. Method according to claim 11, characterized in that the clutch temperature is determined by means of a temperature model, wherein at least one of the parameters transmission temperature, engine temperature, ambient temperature, engine coolant temperature, and elapsed time since the engine was last turned off is taken into account.

14. Method according to one of the claims 11 to 13, characterized in that a maximum amount of change of the friction value is set as a function of the clutch temperature.

15. Method according to claim 14, characterized in that the maximum amount of change of the friction value is set as a limit value for a gradient dT/dt of the clutch temperature as a function of time.

16. Method according to claim 14 or 15, characterized in that the limit for the maximum amount of change of the friction value is adjustable.

17. Method according to claim 16, characterized in that the limit is adjustable as a function of the clutch temperature.

18. Method according to one of the claims 14 to 16, characterized in that when the vehicle is switched off, information relating to the clutch temperature is stored, and when the vehicle is switched on again, the information

is retrieved for the determination of the current friction value at the time the vehicle is switched on.

19. Method according to claim 18, characterized in that after the vehicle has been switched on at a time when the clutch is still warm, the limit for the maximum amount of change of the friction value is adjusted.

20. Method according to one of the claims 18 or 19, characterized in that the friction value is determined dependent on an amount of time elapsed since the vehicle was last switched off while the clutch was warm.

21. Method according to one of the claims 18 to 20, characterized in that the friction value is determined dependent on the clutch temperature existing at a time when the vehicle is switched on.

22. Method according to claim 20, characterized in that the adaptation of the friction value as a function of the time elapsed since the vehicle was last switched off is made according to a linear relationship.

23. Method according to claim 20, characterized in that the adaptation of the friction value as a function of the time elapsed since the vehicle was last switched off is made based on an assumption that with increasing time since the vehicle was last switched off, the current friction value asymptotically converges towards an ambient-temperature friction value.

24. Method according to one of the claims 1 to 10, characterized in that a correction is provided for a movement-opposing torque of the vehicle.

25. Method according to claim 24, characterized in that the movement-opposing torque is corrected by means of correction values in the form of a characteristic curve in function of an air resistance.

26. Method according to claim 24, characterized in that the movement-opposing torque is corrected dependent on a grade angle of a road being traveled by the vehicle.

27. Method according to claim 24, characterized in that the correction is performed by means of a correction signal for the movement-opposing torque, wherein the correction signal

is determined based on at least one error between an estimated value and an actual value of at least one quantity.

28. Method according to claim 27, characterized in that a first estimated quantity is constituted by the effective engine torque, and the actual quantity is the engine rpm-rate, wherein a comparison between the two quantities delivers a first error.

29. Method according to claim 27, characterized in that a second estimated quantity is constituted by an effective engine torque, and the actual quantity is a quantity for the determination of the traveling-speed, wherein a comparison between the two quantities delivers a second error.

30. Method according to claim 29, characterized in that the quantity for the determination of the traveling-speed is a wheel rpm-rate.

31. Method according to claim 29, characterized in that the effective engine torque is corrected with an estimated value for the transmitted clutch torque.

32. Method according to claim 28 and 29, characterized in that one of the errors is used to correct at least one estimated quantity.